In the Claims

1-20 (Cancelled)

21. (Currently amended) A method of execution by a computer to represent an MDS (multidimensional scaling) space as a hierarchical data structure, the MDS space defined by a set of points that correspond to a set of objects, wherein distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, the hierarchical data structure searchable to identify objects with similar attributes, the method comprising:

creating a root node comprising coordinates in the MDS space for a first subset of the set of points selected based on the distances between pairs of points, the root node further comprising boundary information in the MDS space for local MDS spaces defined by further subsets of the set of points, the MDS space defined by running MDS on the first subset of points; and

creating a plurality of leaf nodes, each leaf node comprising coordinates in a local MDS space for the points in one of the further subsets.

22. (Cancelled)

23. (Currently amended) The method of claim ~~22~~21, wherein the largest distance between a pair of points is used as base criteria for selecting points for the first subset.

24. (Cancelled)

25. (Previously Presented) The method of claim 21, wherein creating a plurality of leaf nodes comprises:

iteratively grouping the points remaining after selecting the first subset into the further subsets based on coordinates in the MDS space of the remaining points.

26. (Previously Presented) The method of claim 25, wherein the points are grouped using a median cut algorithm.

2

27. (Previously Presented) The method of claim 25, wherein the coordinates of the remaining points are calculated using a single node update process.

28. (Previously Presented) The method of claim 25, wherein creating a plurality of leaf nodes further comprises:

running MDS on the further subsets of points to define the local MDS spaces.

29. (Previously Presented) The method of claim 21, wherein each node further comprises a map relating distances between pairs of points in the associated MDS space with the attribute proximities between the corresponding objects.

30. (Previously Presented) The method of claim 21, wherein the leaf nodes further comprise coordinates for any overlapping portions of the associated local MDS spaces.

31. (Previously Presented) The method of claim 21 further comprising:

identifying a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects.

32. (Previously Presented) The method of claim 31 further comprising:

adding the new point into the subset associated with the identified node; and

redefining the local MDS space for the identified node.

33. (Previously Presented) The method of claim 32, wherein adding the new point comprises:

calculating coordinates of the new point using a single node update process.

34. (Previously Presented) The method of claim 32, wherein redefining the local MDS space comprises:

running MDS on the subset associated with the identified node.

35. (Previously Presented) The method of claim 32 further comprising:

recalculating the boundary information in the root node for the local MDS space for the identified node.

36. (Previously Presented) The method of claim 32 further comprising:

redefining the local MDS space for a traversed node, the traversed node located between the root node and the identified node; and

recalculating the boundary information in the root node for the local MDS space for the traversed node.

37. (Previously Presented) The method of claim 32 further comprising:

redefining the MDS space for the root node; and

recalculating the boundary information in the root node for the local MDS spaces.

38. (Previously Presented) The method of claim 31 further comprising:

determining points in the subset associated with the identified node that are within a pre-determined distance of the new point.

39. (Previously Presented) The method of claim 38 further comprising:

determining points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.

40. (Currently amended) A method of execution by a computer to query a hierarchical data structure to identify objects with similar attributes, the hierarchical data structure comprising root and leaf nodes representing an MDS (multidimensional scaling) space defined by a set of points that correspond to a set of objects, wherein distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, the root node comprises coordinates in the MDS space for a first subset of the set of points and boundary information in the MDS space for local MDS spaces

defined by further subsets of the set of points, and each leaf node comprises coordinates in a local MDS space for the points in one of the further subsets, the method comprising:

identifying a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects;

adding the new point into the subset associated with the identified node; and

redefining the local MDS space for the identified node by running MDS on the subset associated with the identified node.

41. (Cancelled)

42. (Previously Presented) The method of claim 40, wherein adding the new point comprises:

calculating coordinates of the new point using a single node update process.

43. (Cancelled)

44. (Previously Presented) The method of claim 40 further comprising:

recalculating the boundary information in the root node for the local MDS space for the identified node.

45. (Previously Presented) The method of claim 40 further comprising:

redefining the local MDS space for a traversed node, the traversed node located between the root node and the identified node; and

recalculating the boundary information in the root node for the local MDS space for the traversed node.

46. (Previously Presented) The method of claim 40 further comprising:

redefining the MDS space for the root node; and

recalculating the boundary information in the root node for the local MDS spaces.

47. (Previously Presented) The method of claim 40 further comprising:

determining points in the subset associated with the identified node that are within a pre-determined distance of the new point.

48. (Previously Presented) The method of claim 47 further comprising:

determining points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.

49. (Currently amended) A machine-readable medium having executable instructions to cause a processor to perform a method of representing an MDS (multidimensional scaling) space as a hierarchical data structure, the MDS space defined by a set of points that correspond to a set of objects, wherein distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, the hierarchical data structure searchable to identify objects with similar attributes, the method comprising:

creating a root node comprising coordinates in the MDS space for a first subset of the set of points selected based on the distances between pairs of points, the root node further comprising boundary information in the MDS space for local MDS spaces defined by further subsets of the set of points, the MDS space defined by running MDS on the first subset of points; and

creating a plurality of leaf nodes, each leaf node comprising coordinates in a local MDS space for the points in one of the further subsets.

50. (Cancelled)

51. (Currently amended) The machine-readable medium of claim 5049, wherein the largest distance between a pair of points is used as base criteria for selecting points for the first subset.

52. (Cancelled)

53. (Previously Presented) The machine-readable medium of claim 49, wherein creating a plurality of leaf nodes comprises:

iteratively grouping the points remaining after selecting the first subset into the further subsets based on coordinates in the MDS space of the remaining points.

54. (Previously Presented) The machine-readable medium of claim 53, wherein the points are grouped using a median cut algorithm.

55. (Previously Presented)The machine-readable medium of claim 53, wherein the coordinates of the remaining points are calculated using a single node update process.

56. (Previously Presented) The machine-readable medium of claim 53, wherein creating a plurality of leaf nodes further comprises:

running MDS on the further subsets of points to define the local MDS spaces.

57. (Previously Presented) The machine-readable medium of claim 49, wherein each node further comprises a map relating distances between pairs of points in the associated MDS space with the attribute proximities between the corresponding objects.

58. (Previously Presented) The machine-readable medium of claim 49, wherein the leaf nodes further comprise coordinates for any overlapping portions of the associated local MDS spaces.

59. (Previously Presented) The machine-readable medium of claim 49, wherein the method further comprises:

identifying a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects.

60. (Previously Presented) The machine-readable medium of claim 59, wherein the method further comprises:

adding the new point into the subset associated with the identified node; and

redefining the local MDS space for the identified node.

61. (Previously Presented) The machine-readable medium of claim 60, wherein adding the new point comprises:

calculating coordinates of the new point using a single node update process.

62. (Previously Presented) The machine-readable medium of claim 60, wherein redefining the local MDS space comprises:

running MDS on the subset associated with the identified node.

63. (Previously Presented) The machine-readable medium of claim 60, wherein the method further comprises:

recalculating the boundary information in the root node for the local MDS space for the identified node.

64. (Previously Presented) The machine-readable medium of claim 60, wherein the method further comprises:

redefining the local MDS space for a traversed node, the traversed node located between the root node and the identified node; and

recalculating the boundary information in the root node for the local MDS space for the traversed node.

65. (Previously Presented) The machine-readable medium of claim 60, wherein the method further comprises:

redefining the MDS space for the root node; and

recalculating the boundary information in the root node for the local MDS spaces.

66. (Previously Presented) The machine-readable medium of claim 59, wherein the method further comprises:

determining points in the subset associated with the identified node that are within a pre-determined distance of the new point.

67. (Previously Presented) The machine-readable medium of claim 66, wherein the method further comprises:

determining points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.

68. (Currently amended) A machine-readable medium having executable instructions to cause a processor to perform a method of querying a hierarchical data structure to identify objects having similar attributes, the hierarchical data structure comprising root and leaf nodes representing an MDS (multidimensional scaling) space defined by a set of points that correspond to a set of objects, wherein distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, the root node comprises coordinates in the MDS space for a first subset of the set of points and boundary information in the MDS space for local MDS spaces defined by further subsets of the set of points, and each leaf node comprises coordinates in a local MDS space for the points in one of the further subsets, the method comprising:

identifying a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects

adding the new point into the subset associated with the identified node; and

redefining the local MDS space for the identified node by running MDS on the subset associated with the identified node.

69. (Cancelled)

70. (Previously Presented) The machine-readable medium of claim 68, wherein adding the new point comprises:

calculating coordinates of the new point using a single node update process.

71. (Cancelled)

72. (Previously Presented) The machine-readable medium of claim 68, wherein the method further comprises:

recalculating the boundary information in the root node for the local MDS space for the identified node.

73 (Previously Presented) The machine-readable medium of claim 68, wherein the method further comprises:

redefining the local MDS space for a traversed node, the traversed node located between the root node and the identified node; and

recalculating the boundary information in the root node for the local MDS space for the traversed node.

74. (Previously Presented) The machine-readable medium of claim 68, wherein the method further comprises:

redefining the MDS space for the root node; and

recalculating the boundary information in the root node for the local MDS spaces.

75. (Previously Presented) The machine-readable medium of claim 68, wherein the method further comprises:

determining points in the subset associated with the identified node that are within a pre-determined distance of the new point.

76. (Previously Presented) The machine-readable medium of claim 75, wherein the method further comprises:

determining points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.

77. (Currently amended) A computer system comprising:

a processor coupled to a memory through a bus; and

a process executed from the memory by the processor to cause the processor to represent an MDS (multidimensional scaling) space as a hierarchical data structure by creating a root node and a plurality of leaf nodes, the root node comprising coordinates in the MDS space for a first subset of a set of points selected based on the distances between pairs of points, the first subset of points defining the MDS space, and the root node further comprising boundary information in the MDS space for local MDS spaces defined by further subsets of the set of points, the MDS space defined by running MDS on the first subset of points, and each leaf node comprising coordinates in a local MDS space for the points in one of the further subsets, wherein the set of points correspond to a set of objects, and distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, wherein the hierarchical data structure is searchable to identify objects with similar attributes.

78. (Cancelled)

79. (Currently amended) The system of claim 7877, wherein the largest distance between a pair of points is used as base criteria for selecting points for the first subset.

80. (Cancelled)

81. (Previously Presented) The system of claim 77, wherein the process further causes the processor to iteratively group the points remaining after selecting the first subset into the further subsets based on coordinates in the MDS space of the remaining points to create the plurality of leaf nodes.

82. (Previously Presented) The system of claim 81, wherein the points are grouped using a median cut algorithm.

83. (Previously Presented) The system of claim 81, wherein the coordinates of the remaining points are calculated using a single node update process.

84. (Previously Presented) The system of claim 81, wherein the process further causes the processor to run MDS on the further subsets of points to define the local MDS spaces to create a plurality of leaf nodes.

85. (Previously Presented) The system of claim 77, wherein each node further comprises a map relating distances between pairs of points in the associated MDS space with the attribute proximities between the corresponding objects.

86. (Previously Presented) The system of claim 77, wherein the leaf nodes further comprise coordinates for any overlapping portions of the associated local MDS spaces.

87. (Previously Presented) The system of claim 77, wherein the process further causes the processor to identify a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects.

88. (Previously Presented) The system of claim 87, wherein the process further causes the processor to add the new point into the subset associated with the identified node, and redefine the local MDS space for the identified node.

89. (Previously Presented) The system of claim 88, wherein the process further causes the processor to calculate coordinates of the new point using a single node update process to add the new point.

90. (Previously Presented) The system of claim 88, wherein the process further causes the processor to run MDS on the subset associated with the identified node to redefine the local MDS space.

91. (Previously Presented) The system of claim 88, wherein the process further causes the processor to recalculate the boundary information in the root node for the local MDS space for the identified node.

92. (Previously Presented) The system of claim 88, wherein the process further causes the processor to redefine the local MDS space for a traversed node, the traversed node located between the root node and the identified node, and recalculate the boundary information in the root node for the local MDS space for the traversed node.

93. (Previously Presented) The system of claim 88, wherein the process further causes the processor to redefine the MDS space for the root node, and recalculate the boundary information in the root node for the local MDS spaces.

94. (Previously Presented) The system of claim 87, wherein the process further causes the processor to determine points in the subset associated with the identified node that are within a pre-determined distance of the new point.

95. (Previously Presented) The system of claim 94, wherein the process further causes the processor to determine points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.

96. (Currently amended) A computer system comprising:

    a processor coupled to a memory through a bus;

    a process executed from the memory by the processor to cause the processor to query a hierarchical data structure to identify objects having similar attributes, the hierarchical data structure comprising root and leaf nodes representing an MDS (multidimensional scaling) space by identifying a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects, adding the new point into the subset associated with the identified node and redefining a local MDS space for the identified node by running MDS on the subset associated with the identified node, wherein the MDS space is defined by a set of points that correspond to a set of objects, distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, the root node comprises coordinates in

13

the MDS space for a first subset of the set of points and boundary information in the MDS space for the local MDS spaces defined by further subsets of the set of points, and each leaf node comprises coordinates in the local MDS space for the points in one of the further subsets.

97. (Cancelled)

98. (Previously Presented) The system of claim 96, wherein the process further causes the processor to calculate coordinates of the new point using a single node update process to add the new point.

99. (Cancelled)

100. (Previously Presented) The method of claim 96, wherein the process further causes the processor to recalculate the boundary information in the root node for the local MDS space for the identified node.

101. (Previously Presented) The system of claim 96, wherein the process further causes the processor to redefine the local MDS space for a traversed node, the traversed node located between the root node and the identified node, and recalculate the boundary information in the root node for the local MDS space for the traversed node.

102. (Previously Presented) The system of claim 96, wherein the process further causes the processor to redefine the MDS space for the root node, and recalculate the boundary information in the root node for the local MDS spaces.

103. (Previously Presented) The system of claim 96, wherein the process further causes the processor to determine points in the subset associated with the identified node that are within a pre-determined distance of the new point.

14

104. (Previously Presented) The system of claim 103, wherein the process further causes the processor to determine points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.

105. (Currently amended) An apparatus to represent an MDS (multidimensional scaling) space as a hierarchical data structure, the MDS space defined by a set of points that correspond to a set of objects, wherein distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, the hierarchical data structure searchable to identify objects with similar attributes, the apparatus comprising:

  means for creating a root node comprising coordinates in the MDS space for a first subset of the set of points selected based on the distances between pairs of points, the root node further comprising boundary information in the MDS space for local MDS spaces defined by further subsets of the set of points, the means for creating a root node further comprising means for running MDS on the first subset of points to define the MDS space; and

  means for creating a plurality of leaf nodes, each leaf node comprising coordinates in a local MDS space for the points in one of the further subsets.

106. (Cancelled)

107. (Currently amended) The apparatus of claim ~~106~~105, wherein the largest distance between a pair of points is used as base criteria for selecting points for the first subset.

108. (Cancelled)

109. (Previously Presented) The apparatus of claim 105, wherein the means for creating a plurality of leaf nodes comprises:

  means for iteratively grouping the points remaining after selecting the first subset into the further subsets based on coordinates in the MDS space of the remaining points.

110. (Previously Presented) The apparatus of claim 109, wherein the points are grouped using a median cut algorithm.

111. (Previously Presented) The apparatus of claim 109, wherein the coordinates of the remaining points are calculated using a single node update process.

112. (Previously Presented) The apparatus of claim 109, wherein the means for creating a plurality of leaf nodes further comprises:

means for running MDS on the further subsets of points to define the local MDS spaces.

113. (Previously Presented) The apparatus of claim 105, wherein each node further comprises a map relating distances between pairs of points in the associated MDS space with the attribute proximities between the corresponding objects.

114. (Previously Presented) The apparatus of claim 105, wherein the leaf nodes further comprise coordinates for any overlapping portions of the associated local MDS spaces.

115. (Previously Presented) The apparatus of claim 105 further comprising:

means for identifying a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects.

116. (Previously Presented) The apparatus of claim 115 further comprising:

means for adding the new point into the subset associated with the identified node; and

means for redefining the local MDS space for the identified node.

117. (Previously Presented) The apparatus of claim 116, wherein the means for adding the new point comprises:

means for calculating coordinates of the new point using a single node update process.

118. (Previously Presented) The apparatus of claim 116, wherein the means for redefining the local MDS space comprises:

means for running MDS on the subset associated with the identified node.

119. (Previously Presented) The apparatus of claim 116 further comprising:

means for recalculating the boundary information in the root node for the local MDS space for the identified node.

120. (Previously Presented) The apparatus of claim 116 further comprising:

means for redefining the local MDS space for a traversed node, the traversed node located between the root node and the identified node; and

means for recalculating the boundary information in the root node for the local MDS space for the traversed node.

121. (Previously Presented) The apparatus of claim 116 further comprising:

`   means for redefining the MDS space for the root node; and

means for recalculating the boundary information in the root node for the local MDS spaces.

122. (Previously Presented) The apparatus of claim 115 further comprising:

means for determining points in the subset associated with the identified node that are within a pre-determined distance of the new point.

123. (Previously Presented) The apparatus of claim 122 further comprising:

means for determining points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.

124. (Previously presented) A apparatus to query a hierarchical data structure to identify objects with similar attributes, the hierarchical data structure comprising root and leaf nodes representing an MDS (multidimensional scaling) space defined by a set of points that correspond to a set of objects, wherein distances between pairs of points in the MDS space represent attribute proximities for the corresponding pairs of objects, the root node comprises coordinates in the MDS space for a first subset of the set of points and boundary information in the MDS space for local MDS spaces defined by further subsets of the set of points, and each leaf node comprises coordinates in a local MDS space for the points in one of the further subsets, the apparatus comprising:

   means for receiving a query; and

   means for identifying a node for a new point corresponding to a new object based on attribute proximities between the new object and existing objects;

   means for adding the new point into the subset associated with the identified node; and

   means for redefining the local MDS space for the identified node by running MDS on the subset associated with the identified node.

125. (Cancelled)

126. (Previously Presented) The apparatus of claim 124, wherein the means for adding the new point comprises:

   means for calculating coordinates of the new point using a single node update process.

127. (Cancelled)

128. (Previously Presented) The apparatus of claim 124 further comprising:

   means for recalculating the boundary information in the root node for the local MDS space for the identified node.

129. (Previously Presented) The apparatus of claim 124 further comprising:

18

means for redefining the local MDS space for a traversed node, the traversed node located between the root node and the identified node; and

means for recalculating the boundary information in the root node for the local MDS space for the traversed node.

130. (Previously Presented) The apparatus of claim 124 further comprising:

means for redefining the MDS space for the root node; and

means for recalculating the boundary information in the root node for the local MDS spaces.

131. (Previously Presented) The apparatus of claim 124 further comprising:

means for determining points in the subset associated with the identified node that are within a pre-determined distance of the new point.

132. (Previously Presented) The apparatus of claim 131 further comprising:

means for determining points in the subset associated with a traversed node that are within the pre-determined distance of the new point, the traversed node located between the root node and the identified node.
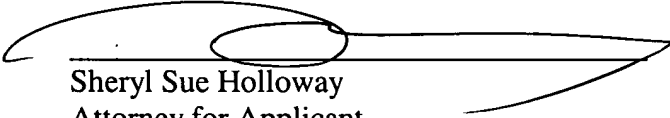
Deposit Account Authorization

Authorization is hereby given to charge our Deposit Account No. 02-2666 for any charges that may be due. Furthermore, if an extension is required, then Applicant hereby requests such extension.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: _Feb. 23_, 200_7_

Sheryl Sue Holloway
Attorney for Applicant
Registration No. 37,850

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-3476